

Teaching IPM: from Field to Classroom

A project from the NYS Integrated Pest Management Program, funded by the Park Foundation

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Introduction

The New York State Integrated Pest Management (IPM) program discovers ways to create a healthier environment and shares this knowledge with New Yorkers, the nation, and the world. We focus on decreasing the risks that are posed by pests and pesticides on farms and in homes, schools, and other public settings. We deliver positive environmental messages to communities through quality educational products. We also have a long history of teaching professional pest managers—on farms, in schools and in private businesses—how to deal with environmental challenges in the least-toxic and most effective manner.

Children are especially vulnerable to risks posed by pests and pesticides, and educating these future generations is the key to long-term solutions. Therefore, we embarked on a project to share our knowledge of IPM with staff and students in the Ithaca School District and surrounding region through a project called ***Teaching IPM: from Field to Classroom***. The project combined our expertise in training school buildings and grounds staff on effective IPM practices with a special curriculum targeted to elementary school children. So kids learned about what IPM is, in schools where IPM is being practiced. Not only did they learn in an environment with fewer risks, they also actively participated in the science of IPM by pursuing activities such as inspecting their school grounds for pests, and investigating the biology and behavior of insects that can infest their buildings and grounds. Students learned to minimize pest problems through everyday activities such as ridding classrooms of food debris and selecting the right plants for the right places outdoors.

Teaching Component: Kids learn the science of IPM

We piloted our program *IPM: Fun with Insects, Weeds, and the Environment* with two classes in the Ithaca school district—a fourth grade at Belle Sherman and a fifth grade at Caroline. Both teachers were excited about the project, helped to plan and deliver the program, and provided valuable feedback throughout. Our IPM team taught four sessions of 45 minutes -1 hour with each class.

The overall teaching objectives were for students to learn:

- What IPM is
- IPM is science-based and fun
- Six steps of IPM
- Practicing IPM is fun, easy, and good for the environment
- Our decisions and actions at school and at home affect our environment
- The people who take care of the places we live, work and play can practice IPM, and we can help them

A brief description of each lesson is given below. For a more complete description, see the student workbook that will be posted on the NYS IPM website in early 2008. <http://www.nysipm.cornell.edu/>

Day 1: What is IPM

On the first day, we surveyed students to find out what they already knew about IPM, insects and weeds; and how they felt about them. We then discussed what makes a “pest” a “pest”, the concept of beneficial insects and even ways in which weeds can be helpful. Students learned the basic tenets of IPM, and got a preview of upcoming classes. They went outdoors and used lots of IPM tools—like cup cutters, sweep nets and magnifying glasses; handled interesting insects and weeds; and practiced basic identification techniques by sorting objects with a key. The kids learned there are lots of careers available for people who are inquisitive, enjoy science and like the outdoors. Being a golf course superintendent, a research scientist or a farmer was starting to sound pretty exciting...

Day 2: Insect IPM

In IPM, correct identification of pests—as well as the good guys—is essential. So is knowledge of their life cycles, habitats, and feeding preferences. Although students are taught the insect life cycle in grades K-4, they often forget the details, and probably weren't exposed to how insect biology relates to the damage an insect can cause, and how insects can be deterred at vulnerable times. In this class, students sharpened their identification skills on real insect specimens, both live and dead. They also learned how insects—like grubs—can be a problem if over a “threshold”, but easy to tolerate if below that level. Similarly, ants in the kitchen or classroom are pests, but outside they do great work in helping to decompose organic matter, recycle nutrients in the soil and even attack pest insects. Lots of hands-on discovery made this a captivating day!

Day 3: Weed IPM

Simply being unwanted makes a plant a weed. Sometimes you just don't want anything growing in your driveway, other times weeds are more malicious—stealing water, light and nutrients from the plants you do want to grow. But even the plants we think of as weeds can be helpful by slowing soil erosion, providing food for beneficial insects, or brightening up a field with their flowers. Weeds are good examples for thinking about the management tactics of IPM: cultural, physical, biological and chemical techniques. Figure out why the weeds are out-competing other plants, and you can often devise a strategy for getting rid of them—or at least making them tolerable. An outdoor “weed hunt” helped kids hone these skills.

Day 4: Field Day, be an IPM Detective

On the last day, students reviewed the steps and concepts of IPM, and applied them in genuine detective style. Groups of four or five children were assigned an area of the school grounds. They spent 20 minutes assessing the site and possible pest situations, using all the tools and techniques they had learned about. Afterwards, the entire class toured each site, where the host group presented an on-site evaluation and recommendations to the rest of the class—as if they were reporting to the school's groundskeeper. Students made many keen observations, realizing that weeds are more problematic on the ball field than out back by the fence; pests in low numbers are not a problem, and site conditions like shade can have a tremendous impact on what grows there.

After the four classes, students were surveyed using the same quiz as the first day to see how their knowledge had expanded. The fourth grade class scored an average of 60% correct on the pre-survey, and improved to 78% after the four IPM sessions. The fifth graders had more prior knowledge with an average score of 88% before the IPM workshops, and 94% after. Both teachers shared information about the IPM classes with parents at their fall open houses, and made brochures available on IPM techniques to use at home. The newfound IPM knowledge and enthusiasm of children is a great way to educate parents about IPM concepts—just as the importance of recycling is embraced and promoted by children.

Each teacher was given a set of hand lenses, resource books and a plant press so they can continue IPM investigations in their classrooms. These tools can also be shared with other teachers. We are working with the pilot teachers to make a version of the workbook lessons that can be used by teachers to deliver an IPM program using experts from their own schools and communities. This revised version will be made available on the NYS IPM Program's web site and other suitable venues.

IPM Training for School Facilities Managers

IPM for school buildings and grounds is an essential element of keeping children safe from the negative effects of both pests and pesticides. However, IPM knowledge is often lacking because school building and grounds superintendents and their staffs are required to address all areas of school facility maintenance. Most are trained in one area (such as building construction or turfgrass management), but lack expertise across the board in issues that need to be addressed both indoors and out. Smaller rural districts are especially lacking in the expertise to fully implement IPM at their facilities. We designed training to specifically help the school districts in and around Tompkins County.

Sports Field IPM

Our first area of focus was sports field IPM. School grounds are typically allocated a minimal maintenance budget, with mowing being the only guaranteed activity. Playing fields, however, receive a great deal of attention and use in all districts. If there is an allowance for irrigation, overseeding, fertilizing, or pest management—sports turf takes priority. Good IPM is difficult to practice with these very limited resources, but the student athletes' safety can be adversely affected when IPM is ignored.

Weeds are the number one turfgrass pest reported by school districts throughout New York State (Braband et al., 2002). On sports fields, weeds are not merely an aesthetic problem. They provide very low traction and create uneven running surfaces for student athletes. Typically, wear on fields compacts the soil and kills grass plants. The soil often remains bare until it is eventually infested with weeds that can tolerate the compaction and wear better than turfgrass plants. Herbicides, if they can be afforded, are often used to keep the weeds at bay. In fact, New York State schools spent a quarter of a million dollars on herbicides in 2003 (NASS, 2004). However, weeds usually return quickly after herbicide use because the underlying causes have not been alleviated. Herbicide use also has the potential to expose student athletes and the environment to negative impacts from these pesticides.

Intensive, repetitive overseeding has been shown to maintain sports fields with more grass and fewer weeds than if an herbicide were used. Therefore, we demonstrated this technique at the Dryden Central School District, where our grounds IPM workshop was to be held in the fall. The practice football field was selected because in August it already showed signs of heavy wear. See photos below. The field was divided in two—lengthwise, and the one half received the heavy overseeding (6 lbs./1,000 ft²) of perennial ryegrass seed on a weekly basis beginning in mid-September, 2007. The field was split in the opposite direction (at the 50 yard line) and one half received a fertilizer application of 15-30-15 at the rate of 1 lb. N/1,000 ft² on September 19th.



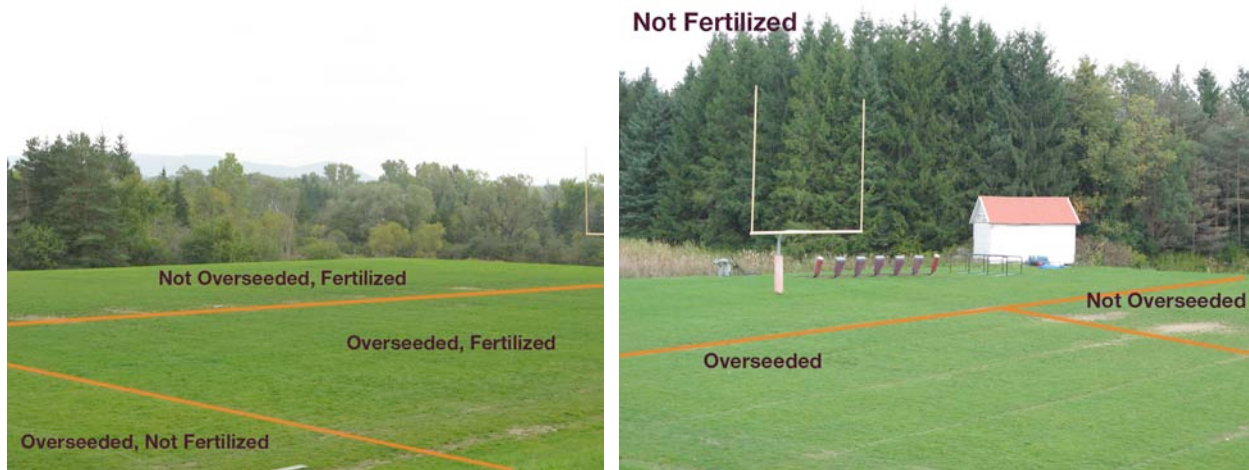
The practice football field before intensive overseeding. August 22 (left), Sept. 12 (right).

A workshop was held in early October to maximize the dissemination of IPM knowledge to school grounds managers. We advertised directly to school grounds managers in central New York and the southern tier through the regional BOCES contacts and the Sports Turf Managers of New York (STMONY). Turn-out was excellent with 31 school personnel, representing 16 districts, and one employee from the city of Cortland attending. Most participants were superintendents of buildings and ground, or held an equivalent title.

Participants received training in many aspects of sports field IPM, including:

- IPM basics for Sports Fields and School Grounds
- Site Assessment for Sports Fields
- Scouting Practices for Assessing Insect and Weed Pressure
- Aerification practices to relieve soil compaction and improve turfgrass growth and cover
- Overseeding to Improve Turf Density & Minimize Weed Populations
- Getting the most out of Fertilizer Applications
- Pest Management Options for Insects, Diseases and Weeds
- Field Demonstrations:
 - Viewing the overseeding demo—to see how intensive overseeding can encourage turf and crowd out weeds
 - How to sample for pests and establish thresholds
 - Importance of proper fertilizer calibration and application

The overseeding demonstration was highly successful. Weekly overseeding clearly improved the turfgrass quality, as shown in the photos below. The application of fertilizer further improved quality and color. Ideally seed is broadcast over the entire field weekly during a particular sports season (e.g. football). However, the cost may be prohibitive (Table. 1). Money can be saved by concentrating on the most highly worn areas of a field, which can save as much as 80% of the cost. The hosting superintendent of buildings and grounds was very pleased with the results, and plans to implement the intensive overseeding program next year.



The practice football field after half the field was intensively overseeded for three weeks, and half the field was fertilized in mid September.

Table 1 Cost per application to overseed a sports field with 6 lb. perennial rye per 1,000 ft², for a one acre field (based on 3 seed costs)

% of field seeded		\$1/lb.	\$2/lb.	\$3/lb.
10%		\$26	\$52	\$77
20%		\$52	\$103	\$155
30%		\$77	\$155	\$232
40%		\$103	\$206	\$310
50%		\$129	\$258	\$387
full field (100%)		\$258	\$516	\$774

In the program evaluations, all participants said their expectations were met or exceeded. Their self-rated knowledge level was raised, on average, one category for all subjects. For example, if someone entered the program with “good” knowledge of how to develop a fertilizer program, s/he scored themselves as “very good” after attending our program. Over half of the respondents stated plans to implement an intensive overseeding program. Other intentions to put the newly-learned information to work, expressed by many participants, included increasing field aerification, assessing grub populations and exploring more pest management options.

Structural IPM

The pests plaguing school structures include mice and rats, ants, yellow jackets and cockroaches. Concern about risks associated with both pests and pesticides inside of schools is heightened because of the close proximity to both students and staff, and the direct human impact of pests, such as the sting of wasps and the allergens produced by mice and roaches. Therefore, another workshop was held in late October, aimed at the structural pest management of school buildings.

Topics included:

- Tenets of a School IPM Program
- Update on State Regulations
 - The neighbor notification law and schools
 - DEC exempt products
 - When an applicator is required to be certified
 - DEC reporting
- Managing Structural Pests. Tactics for:
 - Ants,
 - Stinging insects
 - Rodents
- Pest Management Demonstrations: Hands-on viewing of the tools of IPM
 - Insect monitoring devices
 - “Better” mouse traps
 - Glue boards for rodents
 - Exclusion wiring for birds roosting on rooftops
 - Low toxicity and low exposure baits for insect control
 - Microbial products
- Walking tour of the building, inside and out
 - Inspection processes
 - Sanitation
 - Exclusion
 - Bird control
 - Yellow jacket trapping

This workshop was also advertised through area BOCES, as well as the New York State Pest Management Association. Thirteen managers attended from eleven school districts and one private college, and all participants indicated that their knowledge of pest management had improved as a result of the workshop. They highlighted the most valuable portions of the program as the DEC regulation update, the hands-on and eyes-on walking tour and inspection, and the fact that all of the information was geared to the school environment. All participants found the program to be either “useful” or “very useful,” and predominantly gave an “A” rating to each session presented.

Conclusions

This project was highly successful in:

- Creating and delivering a model curriculum to infuse IPM knowledge into elementary school children, and by extension to their families and communities
- Giving teachers and students avenues to connect with facility staff in and around their own buildings
- Bolstering IPM knowledge and implementation in school facility personnel in Tompkins County and surrounding regions.

We were able to build on our years of experience by introducing IPM concepts in new settings and in innovative ways that make both children and adults better stewards of the environment. We taught IPM techniques to school maintenance personnel including the grounds crew, custodians and cafeteria staff. In the future, we hope that while district personnel are practicing IPM, teachers will learn about IPM and teach its concepts to school children. The students, in turn, will actively participate in their schools IPM by helping to monitor pests and prevent problems. The students will also promote better environmentalism in their communities by sharing IPM knowledge with their friends and families.

References

- Braband, L., E. Horn and L. Sahr. 2002. *Pest Management Practices: A Survey of Public School Districts in New York State*. NYS IPM Program publication #613.
- Chinery, D. 2003. *Heavy Repetitive Fall Overseeding To Improve Low-Input Sports Fields*. Report to The New York State Turfgrass Association.
<http://counties.cce.cornell.edu/rensselaer/HORT/Fall%20Overseeding%20Sports%20fields.htm>
- NASS (New York Agricultural Statistics Service), 2004. *New York Turfgrass Survey*. Ropel, S., B. Smith and C. Howard, contributors.
- Rossi, F. S. 2003. *Aggressive Sports Turf Overseeding*, in "Cornell Field Day '03 Program Booklet," Cornell University, Ithaca, NY.